APPLICATION REVIEW

AND DETERMINATION OF CONTINUED COMPLIANCE

FOR:

TERRA-GEN DIXIE VALLEY, LLC

Churchill County, Nevada

HA – 128

Renewal and Minor Revision to Class I Air Quality Operating Permit

AP4911-0756

FIN A0376

Air Case #11AP0318 Revision

Air Case #11AP0342 Renewal

BY

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR POLLUTION CONTROL

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March 1, 2013 (revised)
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1.0 INTRODUCTION

Terra-Gen Dixie Valley, LLC (Dixie Valley) currently holds Operating Permit AP4911-0756 that was issued February 11, 2007. Dixie Valley owns a geothermal power plant in rural Dixie Valley, Churchill County, Nevada. The electrical nameplate rating on this plant is 67.23 MVA gross @ 0.962 power factor which equates to 64.675 MW gross. The facility is located approximately 98 miles northeast of Fallon, Nevada in Churchill County. The site consists of a dual flash power plant, geothermal production and injection wells, and other associated equipment and facilities. The project is mainly located on Bureau of Land Management geothermal leases.

Dixie Valley submitted a minor revision application to the Bureau of Air Pollution Control (BAPC) on April 25, 2011 (Application Log# 11AP0318) for their Operating Permit to revise the following:

- System 01 – Cooling Tower
    - Clarify the H_2S sampling frequency from "bi-annually" to "every two years". The facility has performed H_2S sampling annually since 1993; and the sampling has indicated no exceedances of the permitted limit.
    - The H_2S sampling location is revised from "each active geothermal well" to "High Pressure (HP) and Low Pressure (LP) steam separators. This is the location where steam is collected for the process.
    - The requirement to sample H_2S in the injectate and to calculate the H2S loss by oxidation have been removed from the permit. This will overestimate the emissions of H_2S; however, emissions have historically been below the permitted limit.
    - The sampling frequency for TDS has been revised from "quarterly" to "semi-annual" to align with the facility's NPDES Permit.
- Systems 02 / 03 – Black-Start Diesel Generators (Note that the Black Start Generators, because of their use, are treated as Emergency Generators under the NESHAP Subpart ZZZZ)
    - Increase PM/PM_{10} emissions from 1.54 pounds per hour to 4.54 pounds per hour; and 0.38 ton per year to 1.13 tons per year. This revision is to return the PM Potential to Emit (PTE) of the black-start generators to previous permitted limits and to allow the generators to operate at full load. This increase in PM does not constitute a significant revision (greater than 15 tons per year) and does not exceed the National Ambient Air Quality Standards (NAAQS) limits in the modeling. The BAPC has allowed this revision.
    - Increase VOC emission limit from 1.36 pounds per hour to 3.00 pounds per hour and 0.34 ton per year to 0.75 tons per year. This revision is to allow the generators to operate at very low loads. The requested emission limits are to allow for flexible use of the generators while remaining well within both regulatory and permit limits. This increase in VOC does not constitute a significant revision (greater than 40 tons per year).
- In addition to the revision of the current permitted sources, Dixie Valley is proposing to install a Binary Bottoming Cycle System to extract an additional 5 Megawatts from the brine solution prior to injection into the wells. The proposed system will use R134A (1,1,1,2-tetrafluoroethane (HFC–134a)) as the binary flash fluid. Pursuant to 40CFR51.100(s)(1), R134A is exempt from being a Volatile Organic Compound, which would be the only source of emissions from the new system. Therefore the new system is exempt from any air regulations and will not be permitted.

In addition to the minor revision, Dixie Valley submitted the renewal application (Application Log# 11AP0342) on May 10, 2011. The renewal and minor revision will be processed at the same time.

In addition to the requested revision/renewal, BAPC has:

- Updated regulatory references.
- NESHAP Subpart ZZZZ requirements were added to the Black Start Generator Systems.
- Removed the Emergency Generator and Emergency Fire Pump from the insignificant activity list and added these unit to the permit because of the promulgation of NESHAP Subpart ZZZZ.

The Standard Industrial Classification (SIC) for Dixie Valley is 4911 (Electric Services), since the Dixie Valley plant engages in generating electricity. Although Dixie Valley's SIC is 4911 it is not one of the Prevention of Significant Deterioration (PSD) 28 source categories with 100 tons per year (tpy) Major Source Threshold as outlined in 40CFR52.21. Current emission estimates indicate that Dixie Valley will not be a major stationary source (emissions of NSR regulated pollutants are limited to less than 250 tons per year) for Prevention of Significant Deterioration (PSD) purposes. However, the emission estimates indicates that the emissions will be above the Class I Title V applicability threshold of 100 tons of any NSR regulated pollutant emitted per year. The specific Standard Classification Code for each process will be discussed later in the System description section.

1.1 AIR QUALITY PERMITTING HISTORY

- The original Title V permit application was submitted by Oxbow Geothermal Corporation on 6/7/96 and listed as air case #96AP0274. New permit #AP4911-0756 was issued and the new air case number became 97AP0041.
- The minor revision to add two (2) Black-Start diesel generators was submitted on 1/5/99 under air case #99AP0161. This was returned incomplete and resubmitted on 1/29/99 under air case #99AP0203. The permit was determined complete and was issued on 5/21/99.
- The facility requested a name-change from Oxbow Geothermal Corporation to Caithness Dixie Valley, LLC (CDVL) on 6/29/2000 under air case #00AP0448 as an administrative amendment. This name change is incorporated with the issuance of the facility-wide Title V permit on February 11, 2002.
- A renewal application was submitted on April 27, 2006. The renewed permit was issued on February 11, 2007.
- An Administrative Amendment application was submitted on February 12, 2008 to change the name from Caithness Dixie Valley, LLC to Terra-Gen Dixie Valley, LLC. The amended permit was issued on February 13, 2008.

2.0 DESCRIPTION OF PROCESS

2.1 OVERVIEW

Permitted operations at the Dixie Valley facility include two (2) Black-Start diesel generators and a cooling water tower. Dixie Valley owns and operates a geothermal power plant permitted to generate up to 65 MW (net) of electricity. The site consists of a dual flash power plant, geothermal brine production and injection wells, and other associated equipment and facilities. The main components of the power plant include the steam separation vessels, the steam turbine-generator, cooling tower, vent silencers, circulating water pumps, injection pumps,

steam jet ejectors, heat exchangers and generator hydrogen cooler, lube oil coolers and chemical treatment equipment. Other associated equipment includes the fire pump, potable water pumps, transformers, electrical substation, emergency generators and black start generators (emergency generators). The facility operates throughout the year and produces electrical energy for sale to Southern California Edison.
A total of 10 geothermal brine production wells produce geothermal fluid. This fluid is sent through two-phase (steam and water) lines to local wellhead separator stations in order to minimize pressure drop and allow for maximum utilization of the resource. This first separation process occurs in the wellhead separators at a pressure of 90 - 100 psia. The wellhead separation vessels are vertical cyclone separators which feature high quality separation of the steam and brine. The geothermal fluid is transported from the well head separators by independent steam and liquid lines to the power plant. At the power plant, the steam line is routed to a pair of high pressure steam purifiers in order to capture entrained mist prior to the clean steam being delivered to the turbine high pressure entry.

The second separation or flash of the brine occurs at the power plant. Saturated liquid from the bottom of the wellhead separators is introduced to the low pressure flash vessels and flashed to steam at a pressure of 5 - 20 psia. The steam from the low pressure flash vessel is routed to a pair of low pressure steam purifiers to remove entrained mist and is sent to the low pressure entry of the turbine generator. The combination of high pressure and low pressure steam drive the turbine, which in turn drives the generator to produce electrical power. The maximum allowable geothermal brine throughput will not exceed 7,500,000 lb/hr.

The remainder of the power plant is for condensing the exhaust steam, removal and discharge of non-condensable gases and routing of cooling water overflow and unflashed brine to the brine injection wells. The condenser receives the exhaust steam from the turbine and condenses the steam to water using a stream of cooler water from the cooling tower. The condenser operates at a very low pressure of approximately 3 inches of mercury in order to allow the plant to operate more efficiently and minimize the brine requirements from the wells. Less than 0.255% of the geothermal fluid (by weight) is non-condensable gases, of which more than 90% is carbon dioxide. The non-condensible gases are removed from the condenser by means of steam jet ejectors. The non-condensable gases are transported to the cooling tower and routed through a dispersion header near the cooling tower fan cells.

The cooling tower removes waste heat from the turbine exhaust condensate and releases this heat to the atmosphere. The cooled condensate becomes part of the cooling tower circulating water and is used in the facility cooling system. The rate of circulating water is 40,000,000 lb/hr. Cooling water overflow is sent to the brine reinjection line for eventual reinjection along with unflashed brine to the geothermal resource. Circulation of water from the condenser to the cooling tower is accomplished by two large circulating water pumps. Water is sent from the cooling tower to the condenser by the differential pressure between the condenser and the cooling tower basin. The cooling tower is a mechanical draft counter flow tower with seven fan cells constructed of treated fir with PVC filling. Cooling water is treated with caustic soda to control ph.

A 200-kw (315Hp) emergency generator starts automatically, in order to provide emergency power for plant systems, if a plant trip occurs due to an unscheduled facility outage. One or both of the Black-Start generators are manually started, if longer plant outages occur. One or both of the Black-Start generators assume plant auxiliary load during planned facility maintenance, which requires the turbine, hot well pumps etc. to be shut down and well production to be reduced to minimum flow.

The majority of emissions from the Dixie Valley facility are the result of release of non-condensable gas from the flashed geothermal brine and the operation of diesel engines for the generation of emergency electrical power. There are numerous potential emission points of non-condensable gases throughout the facility. However, the total facility emissions are based on the total amount of brine produced and the non-condensable gases contained in that brine. For the purposes of this application, all the emissions of non-condensable gases have been assigned to the cooling tower.

The Standard Classification Code (SCC) is for the Cooling Towers is 10101502 for Electric Generation, Geothermal Plants, and Cooling Tower Exhaust.

The SCC for the black-start generators and emergency generator is 20100102 Internal Combustion Engine, used for Electrical Generation, combust Distillate Oil (Diesel), and it is a Reciprocating Engine.

The SCC for the emergency fire pump is 20200102 Internal Combustion Engine, used for Industrial uses, combust Distillate Oil (Diesel), and it is a Reciprocating Engine.

2.2 INSIGNIFICANT ACTIVITIES

Pursuant to NAC 445B.288 these sources are not required to obtain an operating permit. Although, the sources are not permitted, the emissions from the combustion units have been added to the total potential to emit for the Dixie Valley Plant.

Emission Unit #	Emission Unit Description	Basis
IA1.001	Diesel Fuel Storage Tank #1 (10,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.002	Diesel Fuel Storage Tank #2 (5,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.003	Diesel Fuel Storage Tank #3 (752-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.004	Diesel Fuel Storage Tank #4 (50-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.005	Highway Diesel Fuel Storage Tank (1,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.006	Off-Road Diesel Fuel Storage Tank (1,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.007	Diesel Fuel Storage Tank: Fire Pump (250-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.008	Lube Oil Tank (Clean Oil) (5,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.009	Lube Oil Tank (Used Oil) (5,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.010	Main Oil Tank (Lube Oil for Generator) (5,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.011	Waste Oil Tank (1,000-gallon capacity)	NAC 445B.288(2)(d) [A]
IA1.012	Unleaded Gas Tank (2,000-gallon capacity)	NAC 445B.288(2)(d) [B]
IA1.013	Unleaded Gas Tank (1,000-gallon capacity)	NAC 445B.288(2)(d) [B]
IA1.014	Waste Oil Space Heater	NAC 445B.288(2)(e) [C]
IA1.015	Lube Oil Tank for Binary Unit (1,975 gallons)	NAC 445B.288(2)(d) [A]

A Storage Tank capacity less than 40,000 gallons
B Approved Pursuant to NAC 445B.288(4), March 01, 1996, Insignificant Activity List
C Heat input is less than 4 MMBtu

3.0 APPLICABLE REQUIREMENTS

Applicable requirements are those regulatory requirements that apply to a stationary source or to emissions units contained within the stationary source as defined in the NAC. In Nevada's Program, the applicable requirements governing the emissions of air pollutants are derived from four categories of regulations. These four categories consist of the Nevada Revised Statutes (NRS), the Nevada Administrative

Code (NAC), the Applicable State Implementation Plan (ASIP), and the Code of Federal Regulations (CFR, contained in various Parts within Title 40).

3.1 GENERALLY APPLICABLE REQUIREMENTS

Of the four categories of regulations governing emissions of air pollutants, there are many generally applicable requirements that apply to stationary sources and emission units located at a stationary source. A comprehensive summary of all the generally applicable permit requirements is contained in Sections I through V of the proposed operating permit provided in Attachment 4.

3.2 SPECIFIC APPLICABLE REQUIREMENTS

The remainder of this section of the review will focus on specific applicable requirements associated with each emission unit or process at the Dixie Valley generating station.

3.2.1 NEVADA REVISED STATUTES

The Nevada Revised Statutes (NRS) are the current codified laws of the State of Nevada. The NRS is the state's statutory authority for the adoption and implementation of administrative regulations The statutes relating to the control of air pollution are contained in Title 40, Public Health and Safety, Chapter 445B, Air Pollution, NRS 445B.100 through NRS 445B.640. The NRS specifies that the State Environmental Commission is the governing body given the power to adopt administrative regulations. Because the NRS is the enabling statutory authority, very few specific applicable requirements are contained in the statutes. The Dixie Valley Plant is subject to the NRS and must comply with all applicable regulations under the NRS.

3.2.2 NEVADA ADMINISTRATIVE CODE

The Nevada Administrative Code (NAC) contains the regulations that have been adopted by the State Environmental Commission (SEC), pursuant to the authority granted by the Nevada Revised Statutes (NRS), relating to the control of air pollution. The NAC requires that, where State regulations are more stringent in comparison to Federal regulations, the State regulations are applicable. The NAC sets forth, by rule, maximum emission standards for visible emissions (opacity), PM_{10} (particulate matter less than 10 microns in diameter) and sulfur emitting processes. Other requirements are established for incinerators, storage tanks, odors and maximum concentrations of criteria air pollutants in the ambient air. Other NAC regulations specify the requirements for applying for and method of processing applications for operating permits. All the equipment considered in this application must meet, at a minimum, the applicable standards and requirements set forth in the NAC, specifically, the emission standards contained in NAC 445B.22027 through 445B.22033 for particulate matter, NAC 445B.2204 through 445B.22047 for sulfur emissions, NAC 445B.22017 for opacity, and the Nevada Ambient Air Quality Standards as set forth in NAC 445B.310 through 445B.311.

3.2.3 NEVADA APPLICABLE STATE IMPLEMENTATION PLAN

The Applicable State Implementation Plan (ASIP) is a document prepared by a state or local air regulatory agency and required to be submitted to the U.S. EPA for approval. Title I of the Clean Air Act is the statutory authority for the U.S. EPA regulations that require a State to submit an ASIP. The ASIP is intended to show how a state, through the implementation and enforcement of the regulations contained in the ASIP, will either show how attainment of the national ambient air quality standards (NAAQS) will be achieved or how a state will continue to

maintain compliance with the NAAQS. Specifically, the emission standards contained in ASIP 445B.2203 for particulate matter, ASIP 445B.22047 for sulfur emissions, ASIP 445B.22017 for opacity, and ASIP 445B.22097 for the ambient air quality standards must not be exceeded.

3.2.4 CODE OF FEDERAL REGULATIONS

The Code of Federal Regulations (CFR) are regulations adopted by the U.S. EPA and published in the Federal Register pursuant to the authority of the granted by Congress in the Clean Air Act. The CFR addresses multiple aspects, including but not limited to, performance standards, testing methods, and monitoring requirements.

3.2.4.1 NEW SOURCE PERFORMANCE STANDARDS

Section 111 of the Clean Air Act, "Standards of Performance of New Stationary Sources" (NSPS), requires EPA to establish federal emission standards for source categories which cause or contribute significantly to air pollution. Each NSPS defines the facilities subject to these requirements and prescribes emission limits for specified pollutants, compliance requirements, monitoring requirements, and test methods and procedures. These standards are intended to promote use of the best air pollution control technologies, taking into account the cost of such technology and any other non-air quality, health, and environmental impact and energy requirements. These standards apply to sources which have been constructed or modified since the proposal of the standard. Since December 23, 1971, the Administrator has promulgated 88 such standards and associated test methods. These standards can be found in the CFR at Title 40 (Protection of Environment), Part 60 (Standards of Performance for New Stationary Sources).

The cooling towers are not subject to any NSPS.

The generators and fire pump are not subject to the requirements of NSPS Subpart IIII - STANDARDS OF PERFORMANCE FOR STATIONARY COMPRESSION IGNITION INTERNAL COMBUSTION ENGINES because the engines were installed September 1987, prior to the July 11, 2005 triggered date.

3.2.4.2 FEDERAL NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

National Emission Standards for Hazardous Air Pollutants (NESHAP) are established in the CFR pursuant to Section 112 of the Clean Air Act Amendments of 1990. These standards regulate air pollutants that are believed to be detrimental to human health. The NESHAP program applies to all sources, both existing and new. These standards are codified in Title 40 CFR Parts 61 and 63.

Part 61, which predates the Clean Air Act Amendments of 1990, includes specific standards, reporting and recordkeeping requirements, and test methods for the initial eight hazardous air pollutants: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. The regulations covering these eight hazardous air pollutants focused on health-based considerations. NESHAPs were established for certain operations that commonly emit the eight hazardous air pollutants.

Other substances were included for consideration due to the serious health effects, including cancer, which may occur from ambient air exposure to those substances. However, no specific restrictions were placed on facilities that used or released these compounds.

Under the Clean Air Act Amendments of 1990, Congress greatly expanded the Air Toxics program, creating a list of 189 substances to be regulated as hazardous air pollutants. Rather than regulating individual pollutants by establishing health-based standards, the new Air Toxics program granted EPA the authority to regulate specific industrial major source categories with NESHAPs based on maximum achievable control technology (MACT) for each source category. Thus, a number of NESHAPs have been established to regulate specific categories of stationary sources that emit (or have the potential to emit) one or more hazardous air pollutants.

The standards in 40 CFR Part 63 are independent of the NESHAPs contained in 40 CFR Part 61 which remain in effect until they are amended, if appropriate, and added to this part. NESHAPs may cover both major sources and area sources in a given source category. Major sources are defined as those facilities emitting, or having the potential to emit, 10 tons per year or more of one Hazardous Air Pollutant (HAP) or 25 tons per year or more of multiple HAPs. Major sources are required to comply with MACT standards. Area sources are defined as those facilities that are not major sources.

Dixie Valley is not a major source of HAPs. Although Hydrogen Sulfide (H_2S – CAS number 7783064) is listed under the original list of HAPs, the EPA determined that the listing of H_2S as a HAP was a clerical error. A Joint Resolution to remove hydrogen sulfide from the Section 112(b)(1) list was passed by the Senate on August 1, 1991 (Congressional Record page S11799), and the House of Representatives on November 25, 1991 (Congressional Record pages H11217-H11219). The Joint Resolution was approved by the President on December 4, 1991. Hydrogen Sulfide is included in Section 112(r) and is subject to the accidental release provisions.

40 CFR Part 63 Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. However, under amendments to Subpart ZZZZ published in April 2010, the Emergency Generator that was previously designated an insignificant activity became subject to Subpart ZZZZ. All of the generators at Dixie Valley are subject to the requirements of NESHAP Subpart ZZZZ. However, as they are existing generators located at an area source of HAPs, Dixie Valley does not have to comply with the requirements until May 3, 2013. As identified earlier the Black Start Generators, emergency generator, and emergency fire pump are subject to NESHAP Subpart ZZZZ. Note also that the Black Start Generators, because of their use, are treated as Emergency Generators under the NESHAP Subpart ZZZZ.

3.2.4.3 PREVENTION OF SIGNIFICANT DETERIORATION

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act permitting program for new and modified major stationary sources of air pollution. Implementation of the federal PSD regulations is delegated to the State of Nevada by U.S. EPA and these regulations are contained at 40 CFR Part 52.21. Therefore, NBAPC implements the federal PSD regulations directly. These regulations specify federally required permitting procedures for each "major stationary source." The PSD regulations define a "stationary source" as "*any building, structure, facility, or installation which emits or may emit any air pollutant subject to regulation under the Act.*" A "building structure facility or installation" is defined as "*all of the pollutant-emitting activities which belong to the same industrial grouping are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except*

the activities of any vessel. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same 'Major Group' (i.e., which have the same first two digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement."

"Major" is defined as the potential to emit of a stationary source, which equals or exceeds a specified threshold (in tons per year) of any air pollutant regulated under the Clean Air Act (40 CFR 52.21(b)(1)). The first threshold is for a stationary source that emits or has the potential to emit 100 tons per year or more of any regulated NSR pollutant and is defined as one of 28 specific categories of sources (see 40 CFR 52.21(b)(1)(i)(a)). The other applicability threshold is for any other stationary source that emits or has the potential to emit 250 tons per year of any regulated NSR pollutant (see 40 CFR 52.21(b)(1)(i)(b)).

As mentioned above, the SIC code for this facility is 4911. But, Dixie Valley is not considered one of the 28 Source Categories as identified under 52.21 with a "Major" threshold of 100 tpy. As described in Section 4.0 of this review, Dixie Valley has been permitted to emit less than the 250 tons per year threshold for several pollutants and, as such, is not classified as a major source for PSD purposes. However, the emission estimates indicates that the emissions will be above the Class I Title V "Major Source" applicability threshold of 100 tons of any regulated pollutant emitted per year.

3.2.4.4 Acid Rain

Dixie Valley is not subject to any requirement of the Acid Rain Program.

3.2.4.5 Compliance Assurance Monitoring (CAM)

The U.S. EPA has promulgated requirements for sources to provide detailed monitoring plans that will ensure compliance with all applicable requirements. These monitoring requirements are contained in 40 CFR Part 64. Section 64.2 specifies that these monitoring requirements apply to a "pollutant specific emission unit at a major source" if all of the following are satisfied:

- The unit is subject to an emission limitation or standard;
- The unit uses a control device to achieve compliance with any such emission limitation or standard; and
- The unit has potential pre-control device (uncontrolled) emissions equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

The key factors that would require the submission of a CAM plan are:

- the facility must be defined as a "major source"; and
- the units must be subject to an emission limitation or standard (acid rain limitations and standards are not included).

The Dixie Valley facility does not use a control device to control emissions on any of their permitted emission units. Therefore, the Dixie Valley facility is NOT subject to CAM provisions.

4.0 EMISSIONS INVENTORY

4.1 PROPOSED EMISSIONS

Emissions for permitted emissions units are listed in the table below, while insignificant activities emissions are included in the total facility-wide emissions inventory.

Table 4.1 – Facility Wide Potential to Emit

Unit Description	Emission Rate (tons/yr)								
	PM	PM10	PM2.5	NO_X	SO_2	CO	VOC	CO2e	H_2S
PF1.001 Cooling Tower	3.50	3.50	3.50	NA	NA	NA	NA	34,658	175.0
S2.001 Black Start Generator #1	1.13	1.13	1.13	13.7	1.84	10.7	0.75	634	NA
S2.002 Black Start Generator #2	1.13	1.13	1.13	13.7	1.84	10.7	0.75	634	NA
S2.003 emergency generator	0.04	0.04	0.04	0.52	0.03	0.11	0.04	19.4	NA
S2.004 emergency fire pump	0.03	0.03	0.03	0.44	0.03	0.09	0.03	16.3	NA
Insignificant Activities	0	0	0	0.002	0.0001	0.0003	0.80	NA	NA
TOTAL Including Insignificant Activities	5.84	5.84	5.84	28.3	3.74	21.60	2.37	35,961.7	175.0

5.0 AMBIENT AIR IMPACT Analysis

5.1 INTRODUCTION

Dixie Valley is not required to submit an Air Quality Impact Analysis because the revision is less than the 10 tons threshold that requires Dixie Valley to conduct modeling for revision (NAC445B.310.1(b)(2)). The purpose of this analysis is to determine the likely air quality impacts resulting from the increased PM_{10} emission rate from the generators. The permitted emission sources were discussed previously in the technical review.

5.2 CLASSIFICATION OF AIR BASIN

This facility is located within Hydrographic Basin 128 – Dixie Valley. The basin is currently designated as unclassifiable/ attainment for all regulated air pollutants. The unclassifiable/attainment designation has been developed due to lack of monitoring data available to properly classify an air basin. This basin has no Major PSD sources, therefore it is not triggered for the regulated pollutants PM_{10}, SO_2 or NO_X.

5.3.1 AIR DISPERSION MODEL

The dispersion modeling was conducted using the American Meteorological Society/ Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD) version 12060, which is consistent with the NDEP PSD increment tracking system. The approved version of AERMOD includes the PRIME downwash algorithms (EPA 2002).

AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD is a modeling system with three components: AERMAP is the terrain preprocessor

program; AERMET is the meteorological data preprocessor; and AERMOD includes the dispersion modeling algorithms. AERMOD was developed to handle simple and complex terrain issues using improved algorithms. As with the Complex Terrain Dispersion Model (CTDMPLUS), AERMOD uses the dividing streamline concept to address plume interactions with elevated terrain.

5.3.2 METEOROLOGICAL DATA

There is no on-site meteorological data available at the Dixie Valley facility, therefore, off-site meteorological data from the nearest representative National Weather Service (NWS) site was used in the modeling. In an air quality modeling study when using off-site meteorological data, EPA recommends using five years of meteorological data if readily available. The State pre-selected the NWS surface and upper stations that were used in the modeling study. The surface station selected is Lovelock Derby Field and the upper air data is from Winnemucca. On the US EPA SCRAM website, for Lovelock Derby Field, five years of meteorological data was used for the modeling, 2006 through 2010.

These five years of data were processed into model-ready format using AERMET software, version 11059 (EPA 2004). AERMET processed the Lovelock Derby Field data and upper air data from Winnemucca into the proper format using a three-state process. The first stage extracts the data and administers several data quality checks. The second stage merges the data, and the third stage estimates required boundary layer parameters.

5.3.4 SOURCES

The modeling analysis includes an evaluation of building dimensions to assess the potential downwash effects on stack emissions from nearby structures. Direction-specific downwash parameters were calculated using facility plot-plan maps and EPA's Building Profile Input Program PRIME (BPIPPRM) software. Building dimension data were incorporated into AERMOD.

5.3.5 BUILDING DOWNWASH

The modeling analysis includes an evaluation of building dimensions at WCF facility to assess the potential downwash effects on stack emissions from nearby structures. Direction-specific downwash parameters were calculated using facility plot-plan maps and EPA's Building Profile Input Program PRIME (BPIPPRM) software. Building dimension data were incorporated into AERMOD.

5.3.6 RECEPTORS

The modeling was completed using multiple receptor locations to ensure that the maximum estimated impacts are identified. Following EPA guidelines, receptor locations were identified with sufficient density and spatial coverage to isolate the area with the highest impacts. To accomplish this goal, the BAPC used the following receptor setup:

- Plant Boundary Receptors spaced 10 meters apart.
- 1,000 meter x 1,000 meter grid with receptors spaced 25 meters apart and centered on the plant facility.
- 2,000 meter x 2,000 meter grid with receptors spaced 50 meters apart and centered on the plant facility.
- 4,000 meter x 4,000 meter grid with receptors spaced 100 meters apart and centered on the plant facility.
- 8,000 meter x 8,000 meter grid with receptors spaced 200 meters apart and centered on the plant facility.

Model receptors are presented in the Universal Transverse Mercator (UTM) coordinate system using meters and the North American Datum

of 1983 (NAD83). To determine the plant boundary, the latest satellite imagery downloaded from Google Earth was used.

All model receptors were preprocessed using the AERMAP software associated with AERMOD. The AERMAP software establishes a base elevation and a height scale for each receptor location. The height scale is a measure of the receptor's location and base elevation and its relation to the terrain feature that has the greatest influence in dispersion for that receptor.

AERMAP was run using U.S. Geological Survey digital elevation model (DEM) data. Although AERMAP supports both 7.5-minute and 1-degree data resolution, Tetra Tech used 7.5-minute DEM data to give a detailed characterization of the terrain through the region. Output from AERMAP was used as input to the AERMOD run stream file for each model run.

5.3.7 BACKGROUND CONCENTRATIONS

Ambient background concentrations represent the contribution of pollutant sources that are not included in the modeling analysis, including naturally occurring sources. The background concentration for each criteria pollutant is added to the maximum modeled concentration to calculate the total estimated pollutant concentration for comparison with the AAQS.

BAPC did not include fugitive emissions (e.g., roads, vehicles, vehicle traffic, wind erosion from storage piles or exposed ground, mobile sources, etc.) for modeling analysis to assess the ambient air quality impacts. Background concentrations of PM_{10} is included and is taken from the Lehman Caves, NV (24 hour - 10.2 µg/m^3, Annual 9.0 µg/m^3).

5.3.8 AIR QUALITY IMPACT ASSESSMENT

Facility-wide AAQS analyses were performed for PM_{10}; Cumulative modeling for all pollutants demonstrates that Dixie Valley will comply with the AAQS. Table 5-1 shows the AAQS modeling results.

All receptors in the dataset were evaluated for compliance with AAQS.

Table 5.1
Dixie Valley - Ambient Air Quality Impact Analysis

Pollutant	Averaging Period	Modeled Year	Cumulative Highest Modeled Concentration	Background Concentration	Total Concentration	Nevada AAQS	Percent of Standard
			(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(%)
CO	1-hour	2008	2,291	0	2,291	40,500	5.7
	8-hour	2008	599	0	599	10,500	5.7
NO2	Annual	2010	20.3	0	20.3	100	20.3
SO2	3-hour	2009	244.3	0	244.3	1,300	18.8
	24-hour	2008	35.4	0	35.4	365	9.7
	Annual	2010	2.5	0	2.5	80	3.1
PM_{10}	24-Hour	2008	23.1	10.2	33.3	150	22.2
	Annual	2010	1.7	9.0	10.7	50	21.4
H2S	1-hour	2007	85.4	0	85.4	112	76.3

Dixie Valley will not exceed the NAAQS. Included in the attachments to this Technical Review are the receptor layout and modeling results.

6.0 CONCLUSIONS / RECOMMENDATIONS

Based on the above review and supporting data and analyses, operation of the Dixie Valley facility under the draft permit conditions will not result in violations of any applicable ambient air quality standards. Therefore, we recommend that the revised Class I/Title V operating permit be formally issued, with those applicable requirements, conditions, and restrictions contained therein.

Appendix 1 - Facility Location Map

Appendix 2 - BAPC Detailed Emission Inventory

Appendix 3 - Draft Class I Air Quality Operating Permit AP4911-0756.01

Ben Kahue, PE — Date

Staff III Engineer

Bureau of Air Pollution Control

Jeffrey Kinder, PE — Date

Supervisor, Permitting Branch

Bureau of Air Pollution Control

Appendix 1

Facility Location Maps

Appendix 2

BAPC Detailed Emission Inventory

Appendix 3

Draft Class I Air Quality Operating Permit

AP4911-0756.02